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FLOOD INSURANCE STUDY

ORIGINAL
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VILLAGE OF AVOCA, NEBRASKA

CASS AND OTOE COUNTIES

REVISED:

SEPTEMBER 18, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 310247

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Individual components of this Flood Insurance Study (i.e., text, tables, profiles, and maps) are subject to revision as additional data become available. Because revised components may be issued separately, study users should consult the community map repository for those components that are currently effective.

In cases where this Flood Insurance Study and any components thereof warrant revision, a Revisions Description section may be incorporated into this text. When applicable, study users should refer to the Revisions Description to obtain pertinent data and information concerning revisions.

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map
Flood Insurance Rate Map Index

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FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Village of Avoca, Cass County, Nebraska, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Avoca to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

Determination of the areas of study was made at an initial coordination meeting held on April 6, 1976. Representatives of the Village of Avoca, the Nebraska Natural Resources Commission, the Federal Insurance Administration, and the study contractor were present at this meeting. Anticipated future development and past flooding problems in Avoca were also discussed with village officials at this meeting.

In July and August of 1976, contacts for information were made with the U.S. Geological Survey, the Nebraska Natural Resources Commission, the Soil Conservation Service, and the U.S. Army Corps of Engineers.

The final community coordination meeting for Avoca was held on March 22, 1977. The meeting was attended by community officials and a representative of the Federal Insurance Administration. There were no objections to the contents of the report at this meeting.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by Hoskins-Western-Sonderegger, Inc., for the Federal Insurance Administration, under Contract No. H-3999. This work, which was completed in March 1977, covered all significant flooding sources affecting the Village of Avoca.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Avoca, Nebraska. The area of study is shown on the Vicinity Map (Figure 1).

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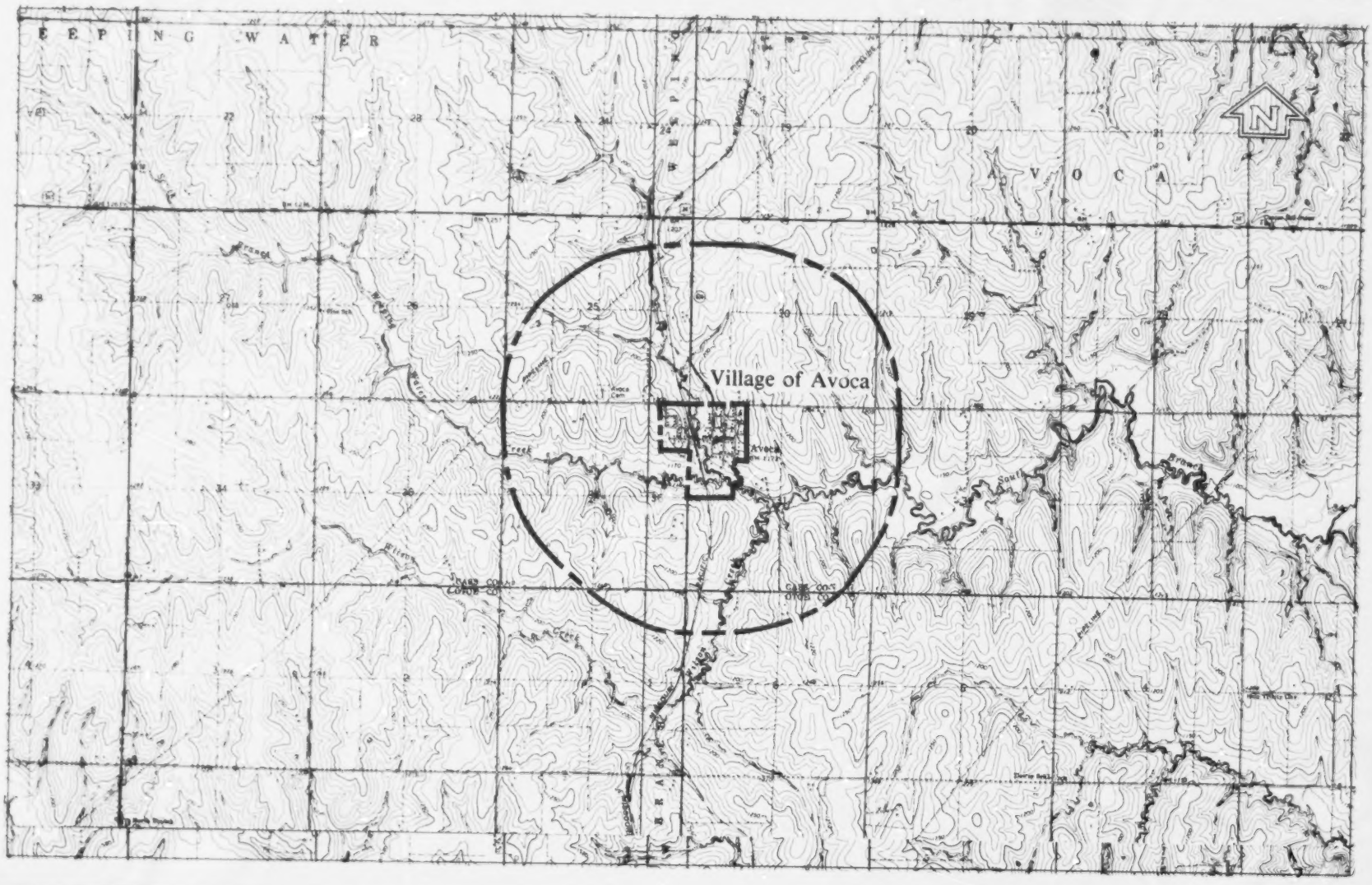

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AVOCA, NE

(CASS AND OTOE COS.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

2

VICINITY MAP

The flooding sources studied were South Branch Weeping Water Creek and Tributary to South Branch Weeping Water Creek. The lengths of both streams within the corporate limits were studied by detailed methods. The areas studied in detail were chosen with consideration given to all anticipated development through March 1982.

2.2 Community Description

Avoca is a small agricultural community located in south-central Cass County in southeastern Nebraska, approximately 30 miles east of the City of Lincoln, Nebraska. It is served by U.S. Highway 34, which is approximately 1.0 mile north of the village; Nebraska State Highway 634, which connects the village to U.S. Highway 34; and the Missouri-Pacific Railroad.

The economy of Avoca, which had a 1970 population of 229 people, is centered around providing services to the surrounding agricultural community, which derives the majority of its income from the growing of corn and other small grains.

South Branch Weeping Water Creek originates northwest of Avoca and flows easterly across Cass County to its confluence with Weeping Water Creek near the Village of Union, Nebraska. The total drainage area of South Branch Weeping Water Creek at Avoca is approximately 10.0 square miles. The Tributary to South Branch Weeping Water Creek originates north of Avoca and flows southerly to its confluence with South Branch Weeping Water Creek. The total drainage area of the tributary is approximately 3.1 square miles.

Almost all development in Avoca is located outside of the flood plains of the two streams studied. According to village officials, there has been very little development within the last 5 years, and no future development is anticipated.

The natural features of the Avoca area are similar to those of all of Cass County. The topography of the area is characterized by rolling hills of loess soils overlying glacial drift.

The climate of the area is a typical midwestern climate, characterized by cold winters and hot summers. Average annual precipitation is approximately 32 inches.

2.3 Principal Flood Problems

Past flooding problems in Avoca have been confined to small areas along the banks of the two streams to be examined in this study. There is no information available on the flood of record at Avoca. The factors that may aggravate flooding in Avoca are constrictive bridges and culverts and channel meandering.

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2.4 Flood Protection Measures

There are no existing flood protection structures or flood plain management measures that reduce the hazard of flooding in Avoca. At the present time, however, the feasibility of flood protection on the Weeping Water Creek Watershed is being studied by the Soil Conservation Service. No specific measures have yet been proposed.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

Peak discharge-frequency relationships for South Branch Weeping Water Creek and its Tributary were determined by a combination of rainfall-runoff relationships and synthetic unit hydrograph techniques. Use of this method required the following assumptions regarding the relationships between rainfall and runoff frequencies: (1) the 10-year peak discharge was produced by the 10-year, 6-hour rainfall; (2) the 50-year peak discharge was produced by the 50-year, 12-hour rainfall; and (3) the 100-year peak discharge was produced by the 100-year, 24-hour rainfall. Point rainfall amounts and the corresponding areal average rainfall amounts of the desired frequency and duration were obtained from U.S. Weather Bureau Technical Paper No. 40 (Reference 1). Runoff for the corresponding rainfall depth was determined using relationships developed by the Soil Conservation Service (References 2 and 3). These relationships are based on land uses and soil conditions in the watershed.

In this study, peak discharges of the desired frequency were assumed to occur at times of wet antecedent moisture conditions in the watershed. The runoff determined by the above methods was distributed over 6 hours using the Soil Conservation Service 6-hour design storm distribution (Reference 4). The peak discharge rate for the runoff was determined using Snyder's synthetic unit hydrograph, with coefficients applicable to the Cass County area for South Branch Weeping Water Creek, and Gray's synthetic unit hydrograph, with coefficients applicable for Nebraska and western Iowa for the Tributary to South Branch Weeping Water Creek. Hydrograph computations were performed using the U.S. Army Corps of Engineers HEC-1 computer program (Reference 5). The 500-year peak discharges for the streams studied were obtained by smoothing and extrapolation of the frequency

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curves determined by the above methods and by applying relationships between the 500-year peak discharges and other frequency peak discharges determined for gaged streams in the area (Reference 6). Table 1 summarizes the discharge-frequency relationships determined for the streams studied in detail.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Cross sections were obtained by field measurements. The locations of the cross sections were selected by inspection of aerial photographs and by field reconnaissance of the area. Cross sections were taken at visible changes in cross sectional area or channel roughness, at all bridges and culverts, at all incoming tributaries, and at various other locations necessary to get a good representation of the channel characteristics. Additional cross sections found to be needed during the hydraulic analyses were interpolated from the field cross sections and from topographic maps (Reference 7). Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are shown on the Flood Boundary and Floodway Map (Exhibit 2).

At each cross section, roughness coefficients (Manning's "n") for the channel and both overbank areas of both streams were determined by field inspection and comparison to calculated values (Reference 8). Roughness coefficients ranged from 0.030 to 0.050 for the channels and from 0.030 to 0.090 for the overbank areas.

The water surface profiles were determined for the 10-, 50-, 100-, and 500-year floods using the U.S. Army Corps of Engineers HEC-2 step-backwater computer program (References 9-12). Input to this model consists of peak flow rates, cross section data, reach lengths between cross sections, characteristics of bridges and culverts, and roughness coefficients.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of + 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). Starting water-surface elevations for South Branch Weeping Water Creek were determined by the slope-area method and by testing a range of starting water-surface elevations at the last downstream cross section. For the Tributary to South Branch Weeping Water Creek, starting water-surface elevations were determined from the rating curve developed at the confluence of the two streams.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

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Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
South Branch Weeping Water Creek					
22.4 Miles Above Mouth	10.0	4,740	8,600	10,200	14,000
Confluence with Tributary to South Branch Weeping Water Creek	6.8	3,260	5,900	7,050	9,500
Tributary to South Branch Weeping Water Creek					
Confluence with South Branch Weeping Water Creek	3.1	1,700	3,140	3,770	5,100

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4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the flood boundaries were interpolated from topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 7). In cases where the 100-year and the 500-year boundaries are close together, only the 100-year boundary has been shown.

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As a minimum standard, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The 1.0 foot maximum flood height increase is the same minimum standard set forth in the 1969 Nebraska Flood Plain Regulations Act.

The floodway boundaries for South Branch Weeping Water Creek and its Tributary were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations

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are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the floodway and the 100-year flood boundary are close together, only the floodway has been shown. Part of the floodway on the South Branch Weeping Water Creek is located outside of the corporate limits.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

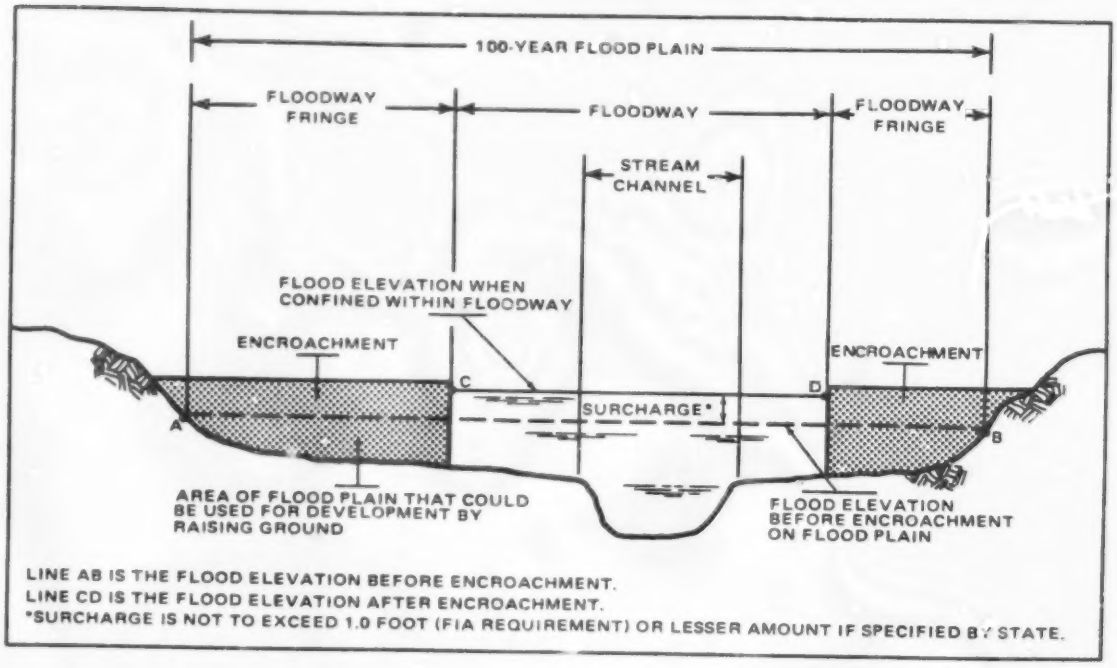
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
A
B
SURCHARGE*
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 2. Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
South Branch Weeping Water Creek							
A	22.665	126[2]	1167	6.7	1157.5	1156.7	0.8
B	22.748	163	1306	9.4	1158.6	1157.7	0.9
C	22.921	125	1108	6.4	1162.2	1161.2	1.0
D	22.929	90	1029	6.9	1162.2	1161.3	0.9
E	22.977	115	1188	5.9	1162.6	1161.8	0.8
F	23.098	232	1906	3.1	1163.3	1162.7	0.6

[1]Miles Above Mouth [2]This Width Extends Beyond Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AVOCA, NE

(CASS AND OTOE COS.)

FLOODWAY DATA

SOUTH BRANCH WEEPING WATER CREEK

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)2	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Tributary to South Branch Weeping Water Creek							
A	0.169	61	562	6.0	1158.4[2]	1157.5[2]	0.9
B	0.253	116	667	5.2	1160.0	1159.2	0.8
C	0.337	60	461	5.1	1162.0	1161.3	0.7
D	0.342	60	505	7.4	1162.8	1162.5	0.3
E	0.352	60	520	7.2	1163.1	1163.0	0.1
F	0.519	90	705	5.4	1165.9	1165.3	0.6
G	0.566	40	458	8.2	1166.3	1165.4	0.9

[1]Miles Above Confluence With South Branch Weeping Water Creek
[2]Elevation Without Consideration of Backwater From South Branch Weeping Water Creek

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AVOCA, NE

(CASS AND OTOE COS.)

FLOODWAY DATA

TRIBUTARY TO SOUTH BRANCH WEEPING WATER CREEK

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the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the Village of Avoca.

5.1 Reach Determination

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
2 to 7 feet	1.0 foot

The study lengths of South Branch Weeping Water Creek and its tributary were determined to have one reach each meeting the above criterion. The location of the reach is shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to determine actuarial insurance premium rate tables for FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the incorporated area of Avoca was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A6: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors.

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Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Avoca is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

No other Flood Insurance Studies or published reports or data dealing with flood problems, other than the U.S. Geological Survey Flood Prone Area Maps (Reference 13) and Flood Hazard Boundary Maps (Reference 14), were found for the Avoca area. These maps were prepared by approximate methods, and, therefore, flood boundaries determined by the present study supersede the approximate determinations in those two studies. This study is authoritative for purposes of the Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, Federal Office Building, 911 Walnut Street, Kansas City, Missouri 64106.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
South Branch Weeping Water Creek Reach 1	0001	-3.20	-0.66	1.38	030	A6	Varies - See Map
Tributary to South Branch Weeping Water Creek Reach 1	0001	-2.95	-0.99	1.33	030	A6	Varies - See Map

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AVOCA, NE

(CASS AND OTOE COS.)

FLOOD INSURANCE ZONE DATA

**SOUTH BRANCH WEEPING WATER CREEK-
TRIBUTARY TO SOUTH BRANCH WEEPING WATER CREEK**

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8.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, David M. Hershfield, May 1961

2. U.S. Department of Agriculture, Soil Conservation Service, Technical Paper 149, A Method for Estimating Volume and Rate of Runoff in Small Watersheds, K.M. Kent, April 1973

3. ----------, Technical Release No. 55, Urban Hydrology for Small Watersheds, January 1975

4. ----------, Engineering Memorandum 27 (revised), Section C, Hydrologic Criteria, March 19, 1976

5. U.S. Army Corps of Engineers, 723-010, HEC-1 Flood Hydrograph Package, Users Manual, January 1973

6. U.S. Geological Survey, Water Resources Investigations 76-109, Magnitude and Frequency of Floods in Nebraska, Emil W. Beckman, October 1976

7. U.S. Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Avoca, Nebraska (1966)

8. ----------, Water Supply Paper 1849, Roughness Characteristics of Natural Channels, Harry H. Barnes, Jr., 1967

9. U.S. Army Corps of Engineers, 723-02A, HEC-2, Water-Surface Profiles, Programmers Manual, October 1973

10. ----------, 723-02A, HEC-2 Water-Surface Profiles, Programmers Manual, June 1973

11. ----------, Hydrologic Engineering Center, Training Document No. 5, Floodway Determination Using Computer Program HEC-2, May 1974

12. ----------, Hydrologic Engineering Center, Training Document No. 6, Application of the HEC-2 Bridge Routines, June 1974

13. U.S. Geological Survey, Flood Prone Area Maps: Scale 1:24,000, Contour Interval 10 feet: Avoca, Nebraska (1973)

14. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Maps, Village of Avoca, Nebraska, July 1975

U.S. Geological Survey, Open File Report 7404, Drainage Area and River Mileage of Nebraska Streams, Part 1, Gordon G. Jamison, April 1974

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9.0 REVISIONS DESCRIPTION (Revised September 18, 1986)

9.1 Purpose

The purpose of this Flood Insurance Study Revisions Description is to incorporate new data into this currently effective Flood Insurance Study for the Village of Avoca, Cass and Otoe Counties, Nebraska. This Revisions Description is intended to provide updated information that aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

9.2 Acknowledgments

The hydraulic information for this Revisions Description was obtained from the U.S. Geological Survey, Surface Water Branch. The Federal Emergency Management Agency (FEMA) reviewed and accepted these data for purposes of this revision.

9.3 Scope

The Flood Insurance Rate Map for the Village of Avoca has been revised to include the extraterritorial limits (ETL) surrounding the Village and to show the approximated Special Flood Hazard Areas within these limits.

9.4 Hydraulic Analyses

Approximated Special Flood Hazard Areas for the South Branch Weeping Water Creek and Wilson Creek were delineated within the ETL. These Special Flood Hazard Areas were determined from U.S. Geological Survey Floodprone Quadrangles (Reference 1). These areas are designated as Zone A on the Flood Insurance Rate Map.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown nor Flood Hazard Factors determined.

9.5 Floodways

The flooding outside the corporate limits was studied by approximate methods, therefore, no floodway was computed.

9.6 Other Studies

The information in this study is in agreement with the Flood Insurance Study for the Unincorporated Areas of Cass County (Reference 2).

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9.7 Location of Data

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Old Federal Office Building, Room 300, 911 Walnut Street, Kansas City, Missouri 64106.

9.8 Bibliography and References

1. U.S. Geological Survey, 7.5 Minute Series Topographic Maps of Floodprone Areas, Scale 1:24000, Contour Interval 10 Feet: Avoca, 1966; Weeping Water, 1966, Nebraska.

2. Federal Emergency Management Agency, Flood Insurance Study, Cass County, Unincorporated Areas, Nebraska, March 1982.

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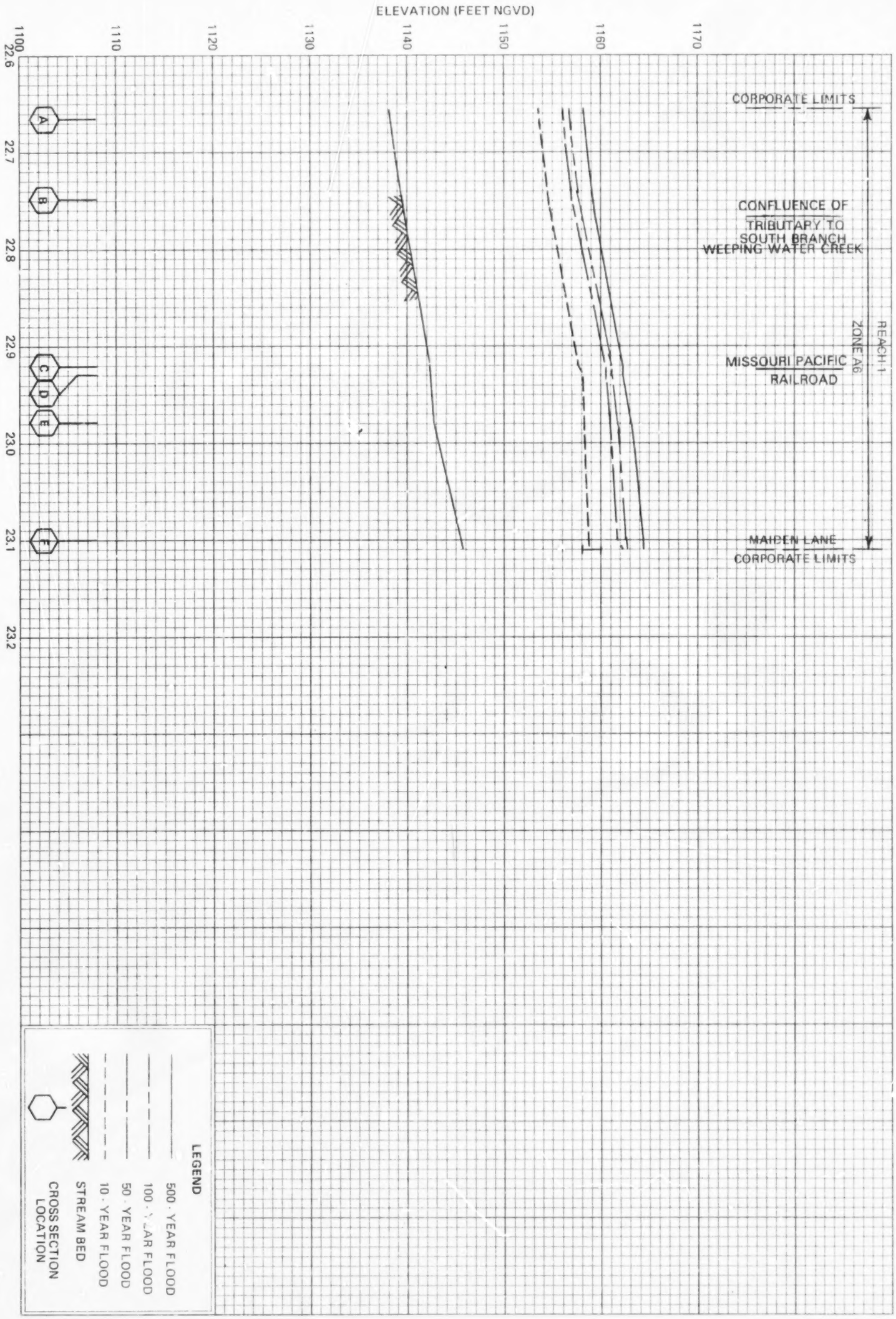

01P	FEDERAL EMERGENCY MANAGEMENT AGENCY VILLAGE OF AVOCA, NE (CASS AND OTOE COS.)	FLOOD PROFILES SOUTH BRANCH WEEPING WATER CREEK

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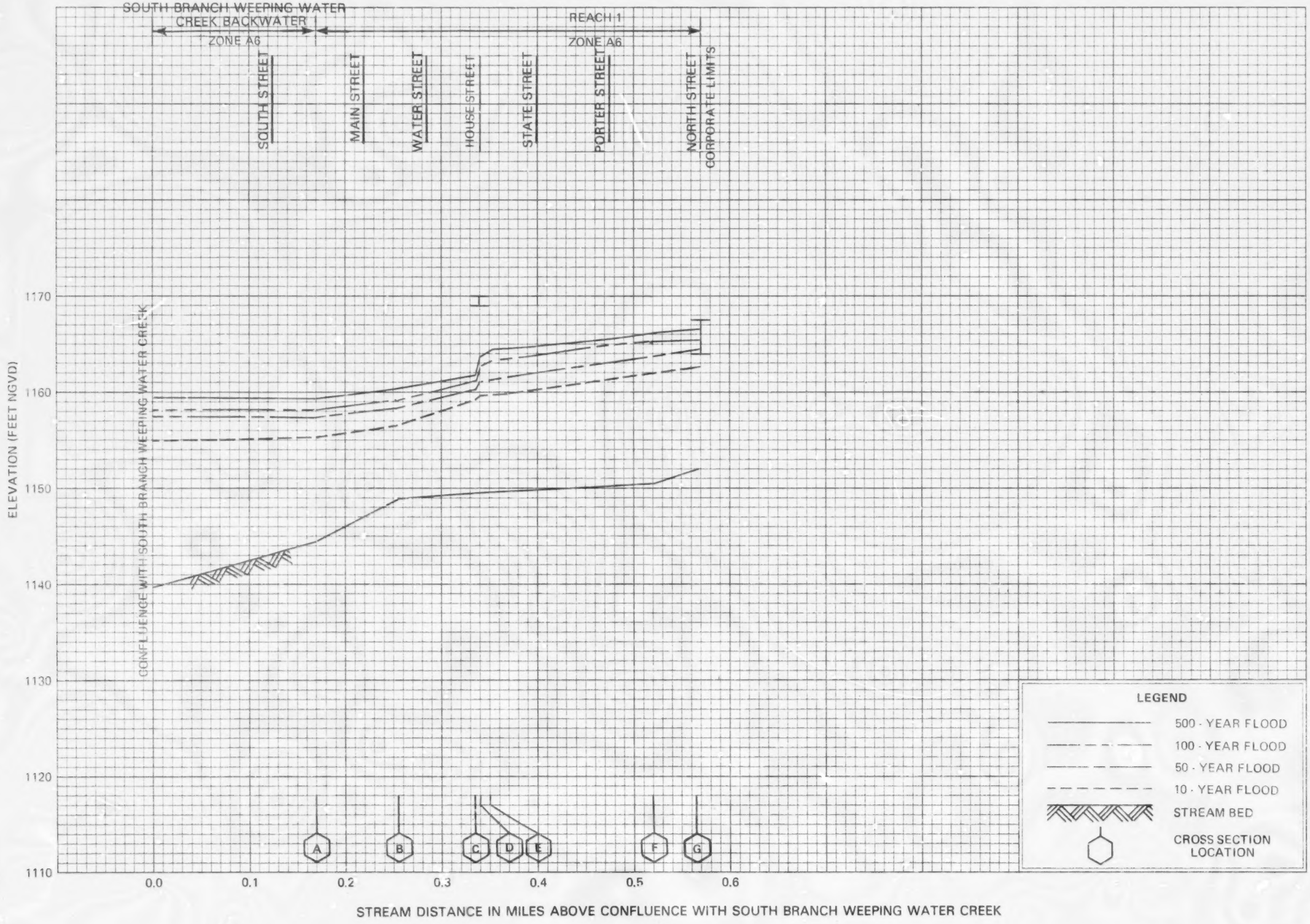

FLOOD PROFILES

TRIBUTARY TO SOUTH BRANCH WEEPING WATER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AVOCA, NE

(CASS AND OTOE COS.)

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